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10/518,825	12/21/2004	Peter Klaus Bachmann	DE020166US	3595

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS  
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EXAMINER
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WOLDEKIDAN, HIBRET ASNAKE

ART UNIT	PAPER NUMBER
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2613

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,825	<b>Applicant(s)</b> BACHMANN ET AL.	
	<b>Examiner</b> Hibret A. Woldekidan	<b>Art Unit</b> 2613	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 28 January 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____.                                     |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>2/09/06,12/21/04</u> .  | 6) <input type="checkbox"/> Other: _____.                         |

## **DETAILED ACTION**

### ***Response to Amendment***

#### ***Withdrawal of Objection***

1. The objection to the drawings of the application is withdrawn.

### ***Response to Arguments***

1. Examiner acknowledges receipt of Applicant's Amendments, remarks, arguments received on 1/28/08. Claims 1-9 have been amended and Claims 10-21 have been added. Applicant's arguments filed on January 28, 2008 have been fully considered but they are not persuasive.

The applicants argued features i.e. an optical signal processing device equipped with a source of electromagnetic radiation of variable intensity, comprising a means of detecting electromagnetic radiation which comprises at least one photoluminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light.

Further the applicant claims the photoluminescent carbon nanotube configured to emit, in response to an input of electromagnetic radiation, light over a range that includes wavelengths from 600 to 700 nm.

The applicant claims read on Frankel in view of Brennen, Brennen, Frankel in view of Brennen further in view of Lieber and Brennen.

Frankel discusses an optical signal processing device equipped with a source of electromagnetic radiation providing a variable intensity and a detector for detecting electromagnetic signals.

Brennen further discusses a carbon nanotube photoluminescent structure configured to emit light at wavelengths which varies non-linearly with the intensity of light. The photoluminescent carbon nanotube emits light over a range that includes wavelengths from 600 to 700 nm.

As a result the argued features were shown by Frankel in view of Brennen, Brennen, Frankel in view of Brennen further in view of Lieber.

Concerning the applicant's argument of a wavelength varying non-linear photoluminescent carbon nanotube structure, Brennen discusses a wavelength varying non-linear photoluminescent carbon nanotube structure.

Concerning the applicant's argument within several of the dependencies Frankel, as discussed above disclosed those limitations, or Frankel modified by the secondary references shows those limitations.

Concerning the applicant's argument regarding combinations of references, both of the references are from the same field, i.e. optical signal processing device. Therefore, the examiner contends that the references would be combinable to one skilled in the art.

Concerning the applicant's argument regarding motivation to combine the references, the motivation to combine was shown in the secondary references, Brennan and Lieber.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel (6,096,496) in view of BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant"

Considering claim 1, Frankel discloses an optical signal processing device equipped with a source of electromagnetic radiation of variable intensity (**See Col. 15 line 40-44, Col. 33 line 9-20, Col. 34 line 60-67 and Col. 35 line 1-7 i.e. different light sources like lamps, laser providing a variable intensity**), an optical component (**See Col. 23 line 7-10 i.e. a scattering medium to radiate light non-directionally**), comprising a means of detecting electromagnetic radiation (**See Col. 31 line 57-67, Col. 32 lines 29-35, fig. 18 i.e. signal detector**)

Frankel does not specifically teach the optical component comprising at least one photo luminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light

Brennen teaches the optical component comprising at least one photoluminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light (**See BRENNAN abstract,**

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**page 57 paragraph 5 i.e. absorbance of nonlinear photoluminescence in carbon nanotubes)**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Frankel, and have the optical component comprising at least one photoluminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light, as taught by Brennen, thus allowing a means of protecting optical devices from high-intensity laser beam, as discussed by Brennen (**Introduction paragraph 1**).

Considering claim 2, Frankel discloses the optical signal processing device of claim 1, wherein the optical component comprises a substrate and a layer having a number of photoluminescent structure (**See Col. 17 line 53-67, Col. 26 line 7-28 i.e. a Laser comprising a substrate and a photoluminescent emitting structure**).

Considering claim 3, Frankel discloses the optical signal processing device of claim 2, wherein the non-linear optical component further comprises an intermediate layer between substrate and the layer having a number of photoluminescent structure (**See Col. 26 line 7-27 and line 44-55, Fig. 15, Fig 16 i.e. a wave guide between the substrate and a layer having a photoluminescent structure**).

Considering claim 4, Frankel discloses an optical signal processing device of claim 1, wherein the electromagnetic radiation is monochromatic coherent

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laser light (**See Col. 19 lines 35-50, Col. 32 line 41-51 i.e. monochromatic coherent laser light which is a single wave length**).

Considering claim 5, Frankel discloses an optical component having at least one photoluminescent structure (**See Col. 17 lines 53-67, Col. 20 lines 48-52, Col. 23 line 7-10 i.e. a scattering medium comprising a photoluminescent emitting structure**).

Frankel does not specifically teach photoluminescent structure is a carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light

Brennen teaches the photoluminescent structure is a carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light (**See BRENNAN abstract, page 57 section 1.5, Page 59 section 3.1, fig. 1 i.e. non linear variation of wavelength versus intensity of photoluminescence carbon nanotubes**).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Frankel, and modify the photoluminescent structure to be a carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light, as taught by Brennen, thus allowing a means of protecting optical devices from high-intensity laser beam, as discussed by Brennen (**Introduction paragraph 1**).

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2. Claims 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankel (6,096,496) in view of BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" further in view of Lieber (7,129,554).

Considering claim 6, Frankel and Brennen do not specifically disclose the optical component of claim 5, wherein the carbon nanotube has a thin film coating

Lieber teaches the optical component of claim 5, wherein the carbon nanotube has a thin film coating **(See Col. 5 line 54-57 i.e. the carbon nanotube has a thin film coating).**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Frankel and Brennen, and modify the carbon nanotube to have a thin film coating, as taught by Lieber, thus providing efficient transport of charge carrier and excitations, as discussed by Lieber **(Col. 1 lines 21-25).**

Considering claim 7, Lieber teaches the optical component of claim 5, wherein the carbon notube is embedded in a non-oxidizing matrix **(See Col. 11 line 6-38 i.e. buffer gas as a non-oxidizing matrix).**

Considering claim 8, Lieber teaches the optical component of claim 5, wherein the carbon nanotube is embedded in a non-oxidizing matrix, which is transparent for electromagnetic radiation **(See Col. 16 line 15-20, Col. 25 line**



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**38-43, Col. 11 line 6-38 i.e. glass which is non-oxidizing and transparent material).**

Considering claim 9, Lieber teaches the optical component of claim 5, wherein the carbon nanotube is embedded in a non-oxidizing, flexible matrix **(See Col. 16 line 15-20, Col. 25 line 38-43, Col. 11 line 6-38 i.e. glass which is non-oxidizing and transparent material i.e. buffer gas as a non-oxidizing matrix).**

Considering Claim 10, Brennen teaches the optical component of claim 5, wherein the at least one photoluminescent carbon nanotube emits light at wavelengths over the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that photoluminescent carbon nanotube emitting light over the wavelength range of 600-700 nm).**

Considering Claim 11, Brennen teaches the optical component of claim 10, wherein the wavelength varying non-linearly with the intensity of said light reaches a maximum at a wavelength in the range from 600 to 800 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that photoluminescent carbon nanotube reaches a maximum intensity over the range of wavelength range of 600-800 nm).**

Considering Claim 12, Brennen teaches the optical signal processing device of claim 11, wherein the wavelength varying non-linearly with the intensity of said light reaches a maximum at a wavelength in the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates photoluminescent**

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**carbon nanotube reaches a maximum intensity over the range of wavelength range of 600-700 nm).**

Considering Claim 13, Brennen teaches the optical signal processing device of claim 1, wherein the at least one photoluminescent carbon nanotube emits light at wavelengths over the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates photoluminescent carbon nanotube emits light at wavelengths over the range of wavelength range of 600-700 nm).**

Considering Claim 14, Brennen teaches the optical signal processing device of claim 13, wherein the wavelength varying non-linearly with the intensity of said light reaches a maximum at a wavelength in the range from 600 to 800 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that the wavelength vary non linearly with the intensity and the photoluminescent carbon nanotube the intensity reaches a maximum over the range of wavelength range of 600-800 nm).**

Considering Claim 15, Brennen teaches the optical signal processing device of claim 14, wherein the wavelength varying non-linearly with the intensity of said light reaches a maximum at a wavelength in the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that the wavelength vary non linearly with the intensity and the photoluminescent carbon nanotube intensity reaches a maximum over the range of wavelength range of 600-800 nm).**

***Claim Rejections - 35 USC § 102***

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 16-18 are rejected under 35 U.S.C. 102(a) as being anticipated by Brennan ME et al.; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant"

Considering Claim 16, Brennan teaches an optical device comprising at least one photoluminescent carbon nanotube configured to emit, in response to an input of electromagnetic radiation, light over a range that includes wavelengths from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that the photoluminescent carbon nanotube emits light over the range 600-700 nm).**

Considering Claim 17, Brennan teaches the optical device of Claim 16 wherein the wavelengths vary non-linearly with intensity of the electromagnetic radiation **(See page 57 section 1.5, Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that the photoluminescent carbon nanotube intensity vary non-linearly with the intensity of the electromagnetic radiation)**

Claim 18 The optical device of Claim 16 wherein an intensity of emitted light reaches a maximum at a wavelength greater than or equal to 600 nm and less than or equal to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates**

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**that the intensity of the emitted light reaches a maximum between 600-700 nm wavelength range).**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brennan ME et al.; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of Lee et al. (6,514,113)

Considering Claim 19, Lee teaches the optical device of claim 16, wherein the at least one photoluminescent carbon nanotube is comprised in a component including a substrate and a layer on the substrate comprising the at least one photoluminescent carbon nanotube **(See Col. 4 line 20-35, Fig. 1 i.e. fig. 1 illustrates that carbon nanotubes comprised in a component including a substrate (element 100) comprising a number of carbon nanotubes (element 400)).**

Considering Claim 20, Lee teaches the optical device of claim 19, wherein the component further comprises an intermediate layer between the substrate and the layer comprising the at least one photoluminescent carbon nanotube **(See Col. 4 line 4-35, Fig. 1 i.e. fig. 1 illustrates that an intermediate**

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**layer(element 200,300) between the substrate(element 100) and carbon nano-tubes (element 400)).**

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brennan ME et al.; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of Frankel (6,096,496).

Considering Claim 21, Frankel discloses the optical device of claim 16, wherein the electromagnetic radiation is monochromatic coherent laser light (**See Col. 19 lines 35-50, Col. 32 line 41-51 i.e. monochromatic coherent laser light which is a single wave length**).

### ***Conclusions***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will

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the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HIBRET A. WOLDEKIDAN whose telephone number is (571)270-5145. The examiner can normally be reached on Monday to Thursday from 8:00 a.m. - 4:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on (571)272-3078 . The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. A. W./

Examiner, Art Unit 2613

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/Kenneth N Vanderpuye/  
Supervisory Patent Examiner, Art Unit 2613